

The Sidecar, closely mated to an Amiga, with an extra 3 1/2 disk drive on top. The Sidecar is about an inch taller than the Amiga system unit.

## Sidecar A First Look

by John Foust

The Sidecar is a hybrid machine that unites the Amiga and IBM PC computers. It provides complete IBM PC compatibility for the Amiga, with a 5 1/4 disk drive, three PC-compatible card slots, 256K of onboard RAM, and a numeric coprocessor socket.

The Sidecar stands an inch taller than the Amiga system unit. It mates directly to the side of the Amiga, to both the system bus and the joystick connectors. It is not a system bus pass-through, so it must be the last peripheral device connected to the Amiga bus connector.

The Sidecar has a single internal slot for an optional Amiga memory expansion board, in 2 megabyte or 8 megabyte sizes. For IBM memory expansion, it has empty sockets for 256K more RAM on the motherboard.

Sidecar has an expected retail price of about \$650. Commodore representatives said it should be available in late summer or early fall. Dealers should have demo Sidecars in mid-summer, as 1500 pre-production models were expected to arrive in early June.

The Amiga continues to work as usual while attached to the Sidecar; it does not harm the multiprocessing capabilities of the Amiga. The PC video display appears as a window or screen on the Amiga display.

However, the Sidecar requires a special Amiga program to run, so this interface software takes up some Amiga memory space.

At the introduction of the Sidecar at COMDEX Spring in Atlanta, Commodore privately encouraged IBM PC hardware and software developers to test the Sidecar for IBM PC compatibility.

All comers succeeded, including a hardware developer who reported his product would not run on many PC clones. "Most of the compatibles crashed with his system," according to an engineer who helped design the Sidecar. The popularity of the PC-10 and PC-20 in Europe also attests to the full compatibility of the Sidecar.

### Hard disk expansion

The floor model of the Sidecar had a 20 megabyte hard disk card installed in one of the slots. This drive can be partitioned for use under both operating systems simultaneously. Each operating system can access the resources of the other. For example, it is possible to share PC-DOS files with AmigaDOS programs, and vice versa.

The Sidecar with a hard disk card offers the most economical path towards a hard disk for the Amiga. "Hard card" disk drives of this type are commonly available for about \$500, for 10 and 20 megabyte versions.

Multifunction IBM cards could add more IBM memory, serial and parallel ports, a battery-backed clock, a modem and more on a single card, starting at \$150. Conceivably, these resources could be used by Amiga programs, as well.





Torsten Burgdorff, an engineer from the West German team that produced the Sidecar. Burgdorff was responsible for much of the Sidecar side of the software interface.

If you have an Amiga 5 1/4 disk drive, you can still use it with the Sidecar, since it has the standard daisy-chain disk drive connector on the back.

### Resource sharing

The Sidecar and Amiga share resources, so the Sidecar does not have its own keyboard, video circuitry, or parallel and serial ports. (Of course, an additional IBM card could provide more ports.)

Extra graphics cards are not necessary with the Sidecar. It emulates both IBM monochrome and color graphics using the Amiga video circuitry.

Monochrome windows reside on the Workbench screen. Color windows reside on a separate pull-down screen, in 640 x 200 resolution. One monochrome window and one color screen can be present at once. However, only one can be selected to run at a time. The sixteen colors available under IBM color graphics can be adjusted with a Sidecar Preference program, using a palette gadget.

To begin with, both types of windows are resizable. The Intuition gadgets scroll bars take up space on the screen, but if you double-click inside the window, the Amiga window borders disappear, and standard 24 lines by 80 columns are available to the IBM program.

The video interface between the Amiga and the Sidecar depends on 128 K of dual-ported video RAM. When the PC program changes anything in on its

screen, the video memory is changed. The Amiga gets an interrupt, and can decide whether to update the PC screen on the Amiga display.

If it chooses to update the screen, the image in the Sidecar video memory is quickly transferred to the Amiga video memory, using the blitter. The priority of this update is selectable with the Sidecar preferences.

### Made in Germany

The Sidecar was developed by the engineers at Commodore Business Machines in Braunschweig, West Germany. It is based on the successful design of Commodore's PC-10 and PC-20, Commodore's IBM PC compatible computers. Many Sidecar engineers were instrumental in the development of both machines.

The PC-10 and PC-20 were formerly sold only in Europe and Canada, but recently, Commodore began marketing them in the U.S.

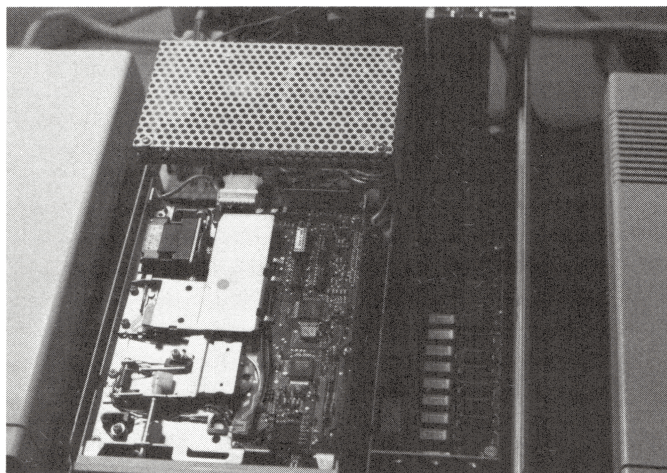
### Janus and Zaphod

The German engineering team adopted the code-name "Janus" for the Sidecar project, after the Roman god. Janus had two faces. His name gives us the month "January".

According to Compuserve Amiga Forum member Jim Ventola, Janus was the first Roman state god, and that the

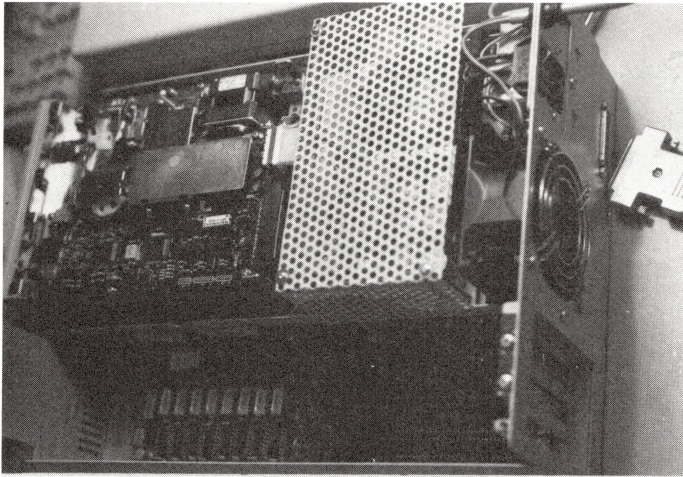


Gail Wellington, from Commodore international marketing, demonstrates the Sidecar to an omnipresent crowd. An extra 3 1/2 disk drive sits atop the Sidecar.

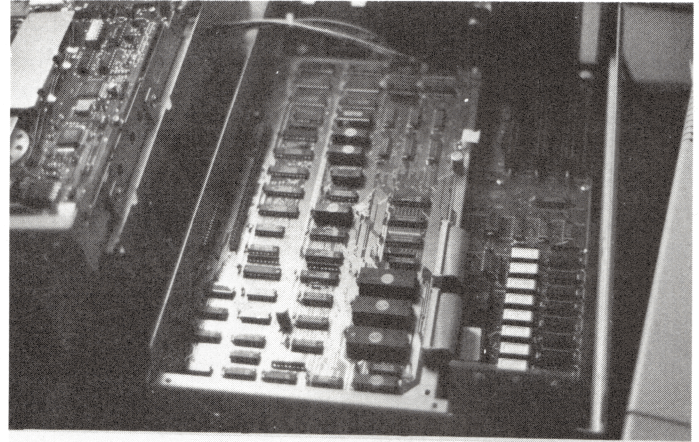


The interior of the Sidecar, with the 5 1/4 disk drive in place.





A rear view of a partially disassembled Sidcar, with the 5 1/4 disk drive in place. The power supplies and muffin fan are at the back of the Sidcar. The three IBM card faceplate holes are at the lower right. An extra disk drive connector is lying next to the DB-23 connector at the right edge of the picture, at the back of the Sidcar.



The Sidcar, facing the camera, with the 5 1/4 disk drive removed and placed off to the left. The circuit board in the center of the picture is normally below the disk drive, and the disk drive power connectors are at the top of the picture. In the middle of the center circuit board, to the left, is the Amiga system bus connector. The 2 meg and 8 meg RAM expansion boards install on this connector, between the disk drive and this circuit board. Along the left edge, and towards the bottom of the picture, are the two DB-9 joystick/mouse connectors. This edge mates with the Amiga system unit.

proper sacrifice for Janus was a ram. However, RJ Mical called the Sidcar "Zaphod", after the character from the book "The Hitchhiker's Guide to the Galaxy." In the book, Zaphod Beeblebrox has two heads. They constantly argue with each other.

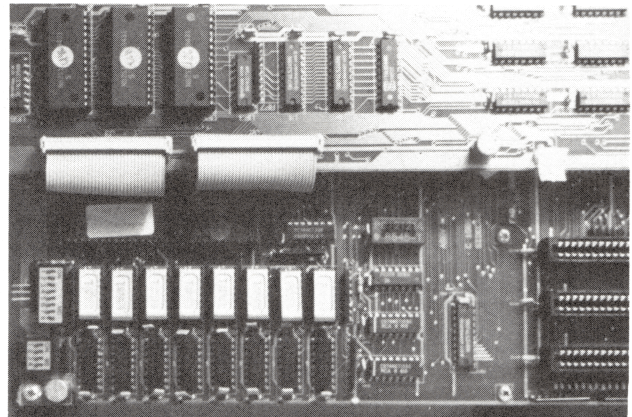
Mical left Commodore-Amiga in January. He was the primary author of Intuition, the windowed user interface on the Amiga. When the Sidcar engineering team needed software for the Sidcar, they sought RJ Mical. For more discussion of Mical's involvement with the Sidcar, see his interview elsewhere in this issue.

The German engineers developed the Sidcar on their own. "We were free to design it. No one said 'This is the way to do it,'" according to Frank Ullmann, a hardware engineer on the German team. "It was easy." Ullmann had done similar work for his master's degree. "There should be no incompatibilities," he said.

Starting with the PC-10 motherboard design, they removed the interface circuitry for the parallel printer, the serial port, and the keyboard, and made the changes for the switch from 5 1/4 drives to 3 1/2 drives.

The number of IBM card slots is still pending, Ullmann said. Also, some of the circuitry will be reduced to custom gate array chips in later production. "It was a very new style of programming, a multitasking I/O driver," according to Torsten Burgdorff, a software engineer. Burgdorff and Ullmann were present at COMDEX, escorting the Sidcar prototypes through customs. The first molded plastic cases arrived just in time for the show.

They tested the first 8 megabyte RAM card for the Sidcar minutes before packing them for COMDEX. The prototype board used new Toshiba 1 megabit RAM chips. The 2 megabyte board uses 256K chips, so both designs use have 64 sockets on the optional memory board.



This view of the Sidcar motherboard clearly shows the standard 256K RAM, and the filled sockets for the additional (but optional) 256K RAM expansion. The 5 1/4 disk drive would rest above the circuit board at the top of the picture, mounted at one edge by the bracket at left. This circuit board is connected to the motherboard by two ribbon cables.

The stickered top of the BIOS ROM chip is visible between the eighteen RAM chips and the left ribbon cable.

The three IBM-compatible card slots are at the right edge of the picture, towards the back of the Sidcar.

#### Sidcar vs. Transformer: Computers in Disguise

The current path to IBM compatibility is the Transformer program, a software emulation of the IBM computer. It is currently bundled with the 5 1/4 disk drive available for the Amiga.

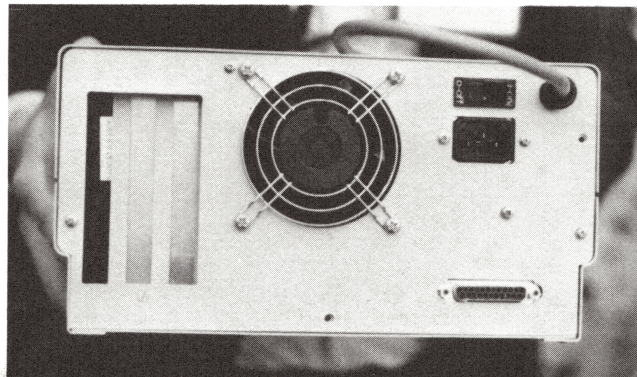
The Transformer, made by Simile Research, of Centerport, New York, interprets the 8088 microprocessor instructions in an IBM program, and mimics their functions with a program written for the 68000 microprocessor in the Amiga. This process is slow, but for many applications, speed is not a limiting factor.



At one point, Commodore announced a hardware accelerator for the software Transformer, but this project has been shelved, according to Simile Research marketing director Doug Wyman. This was to be a set of custom logic chips that accelerated the translation of 8088 instructions to 68000 instructions.

For more information on the Transformer, and Wyman's reaction to the Sidecar introduction, see his interview elsewhere in this issue.

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The rear of the Sidecar. The power switch and extra AC power plug are at upper right. The daisy-chain disk drive DB-23 connector is at lower right, and the faceplates for IBM cards are at left. The muffin fan is at center.

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